

affinities for oxygen, can act as a discharger to another. Two excellent and important consequences follow upon this state of the metal. The first is, that the *equivalent* of electricity is obtained for the oxidation of a certain quantity of zinc; the second, that a battery constructed with the zinc so prepared, and charged with dilute sulphuric acid, is active only whilst the electrodes are connected, and ceases to act or be acted upon by the acid the instant the communication is broken.

737. I have had a small battery of ten pairs of plates thus constructed, and am convinced that arrangements of this kind will be very important,, especially in the development and illustration of the philosophical principles of the instrument. The metals I have used are amalgamated zinc and platina, connected together by being soldered to platina wires, the whole apparatus having the form of the *couronne des tasses*. The liquid used was dilute sulphuric acid of sp. gr. 1.25. No action took place upon the metals except when the electrodes were in communication, and then the action upon the zinc was only in proportion to the decomposition in the experimental cell; for when the current was retarded there, it was retarded also in the battery, and no waste of the powers of the metal was incurred.

738. In consequence of this circumstance, the acid in the cells remained active for a very much longer time than usual.

In fact, time did not tend to lower it in any sensible degree: for whilst the metal was preserved to be acted upon at the proper moment, the acid also was preserved almost at its first strength. Hence a constancy of action far beyond what can be obtained by the use of common zinc.

739. Another excellent consequence was the renewal, during the interval of rest, between two experiments of the first and most efficient state. When an amalgamated zinc and a platina plate, immersed in dilute sulphuric acid, are first connected, the current is very powerful, but instantly sinks very much in force, and in some cases actually falls to only an eighth or a tenth of that first produced (772). This is due to the acid which is in contact with the zinc becoming neutralised by the oxide formed; the continued quick oxidation of the metal being thus prevented. With ordinary zinc, the

evolution of gas at
its surface tends to mingle all the liquid
together, and thus
bring fresh acid against the metal, by which the
oxide formed
there can be removed. With the amalgamated
zinc battery,
at every cessation of the current, the saline
solution against the
zinc is gradually diffused amongst the rest of the
liquid; and